

The AMD Athlon™ Processor Software Performance Guide

**Delivering Superior Performance for
Cutting-Edge Software Applications**

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Table of Contents

■ Introduction	Page 3
■ The Internet Microsoft® Windows® Media Encoder, Ligos GoMotion, ZD's JMark	Page 4-7
■ Digital Content Creation Adobe Photoshop, Adobe PhotoDeluxe, Kinetix 3D Studio MAX	Page 8-11
■ CAD/Workstation Applications Autodesk AutoCAD, SPEC SPECfp, SPEC SPECint	Page 12-14
■ Entertainment Valve Half Life, id Quake II	Page 15-16
■ Speech Recognition Dragon NaturallySpeaking	Page 17
■ Commercial 3D Modeling Geomatrix 3Scan	Page 18
■ Image Compression LizardTech MrSID Publisher	Page 19
■ Mainstream Applications ZD's Business Winstone® 99	Page 20-21
■ Commercial High-End Applications Adobe Photoshop, Kinetix 3D Studio Max, Autodesk AutoCAD, ZD's High-End Winstone 99, BAPCo's SYSmark	Page 22-23
■ 3D Graphics ZD's 3D WinBench™ 99, 3DMark™ 99 MAX Pro by Futuremark Corporation	Page 24-26
■ CPU—Integer ZD's WinBench® CPUMark™, SPEC SPECint	Page 27-28
■ CPU—Floating Point ZD's WinBench FPU WinMark™, SPEC SPECfp	Page 29-30

Introduction

The AMD Athlon™ processor has been designed to power the next generation in computing platforms, delivering the ultimate performance for cutting-edge applications and an unprecedented visual computing experience. The new performance levels and advanced features of the AMD Athlon processor enable software developers to deliver impressive new capabilities to end users running a wide range of business and home software applications.

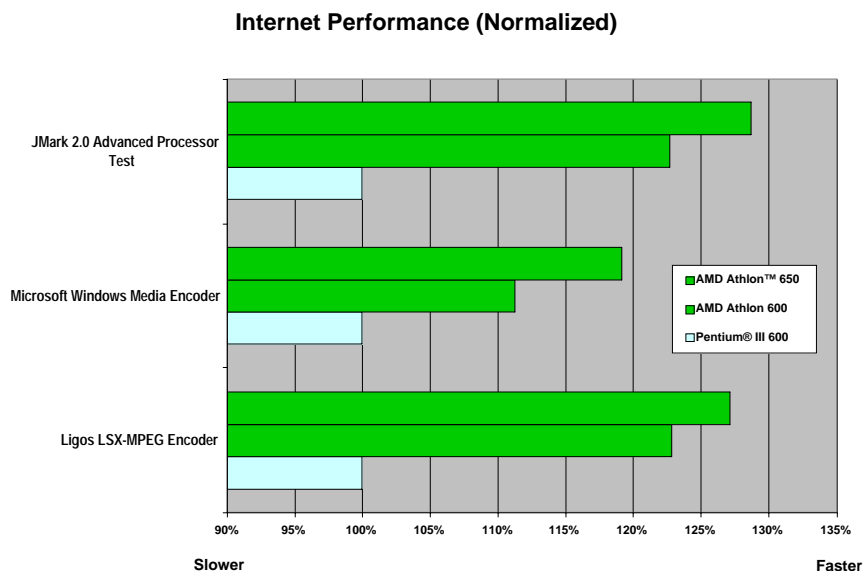
The AMD Athlon Software Performance Guide describes some of the most exciting new applications that are now or soon will be available and outlines the benefits derived from running these applications on platforms based on the next-generation AMD Athlon processor. In addition, this guide will present several industry-standard benchmarks that have been designed to measure key aspects of performance that are important to the end user's overall computing experience.

Leading software companies can use the AMD Athlon processor's next-generation performance and features to deliver cutting-edge applications in many new and exciting software categories. The first half of this guide outlines the benefits of using AMD Athlon processor-based platforms to run new cutting-edge application software in performance-demanding application categories, such as Internet applications, digital content creation, CAD/workstation software, entertainment titles, speech recognition, 3D modeling and image compression. The second half of this guide presents the new performance levels achieved with the next-generation AMD Athlon processor. These performance levels were measured using the most popular industry-standard benchmarks from leading performance measurement companies, such as Ziff-Davis, BAPCo, SPEC, and Futuremark Corporation.

In addition to explaining benefits realized by using the next-generation AMD Athlon processor to run these featured applications, each section below includes a description of the application or benchmark itself, as well as a brief description of the script used to obtain the performance measurement. For detailed information regarding the AMD Performance Tester application used to obtain the application performance numbers and the system configurations, please refer to the Appendix entitled "Configurations and Script Descriptions."

Cutting-Edge Applications

The Internet



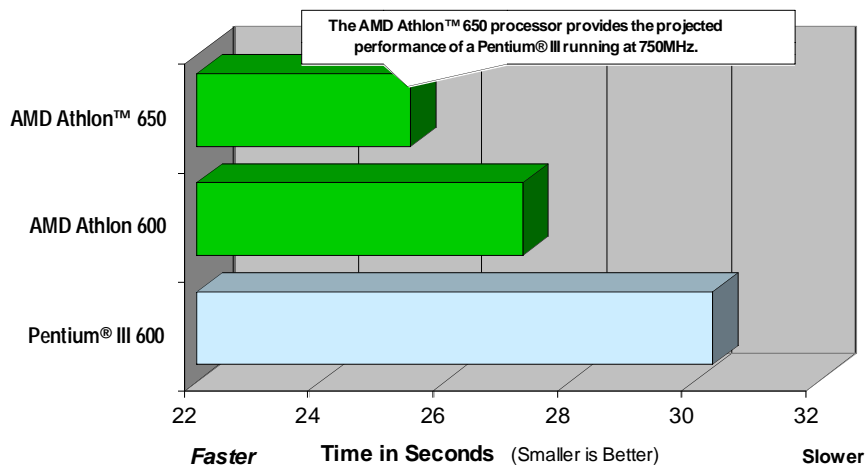
***See system configuration information on page 32.**

Advances in software design combined with exciting new technologies like those found in the new AMD Athlon processor are allowing Internet users and developers to move beyond the simple point-and-click, text-based content of yesterday. Both home and business users now have powerful yet simple tools that allow them to create and view exciting multimedia Internet content that can make the Web come to life with high-resolution streaming video, vibrant 3D graphics, and theater-quality 3D sound. In short, the AMD Athlon processor enables the ultimate Internet experience for end users.

One of the most computation-intensive tasks—video encoding for high-quality streaming over the Internet—executes with impressive speed the AMD Athlon processor, much faster than previously possible without special-purpose hardware. Much of this new content is planned to be delivered to end users through applications or applets that are based on the Java programming language, which is quickly becoming a standard programming language for Web applications. The JMark benchmark from Ziff-Davis measures Java performance and shows that the AMD Athlon is significantly faster than the Pentium III processor family in executing this critical code.

The Internet

Microsoft Windows Media Encoder



*See system configuration information on page 32.

Application Description

Microsoft® Windows® Media Encoder (a component of Microsoft Windows Media Technologies) compresses and encodes audio and video for real-time and on-demand use over the Internet. The compressed file can be multicast or stored on a server and viewed using the Microsoft Windows Media Player.

Script Description

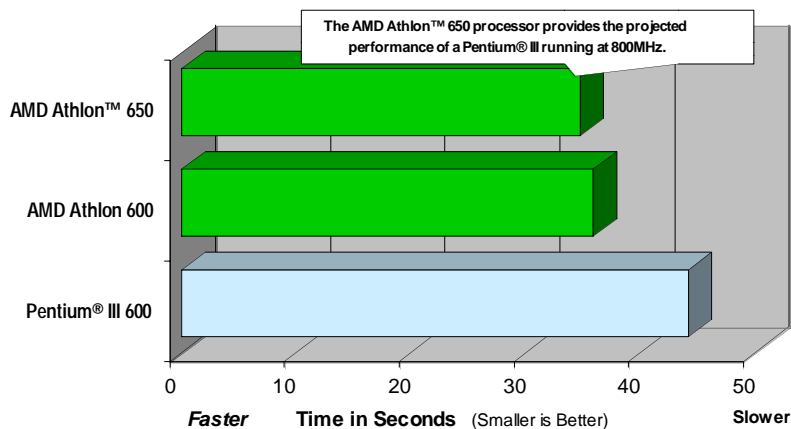
The AMD Performance Tester measures the time to convert a 106-second (30 frames per second) AVI file that is 11.6MB in size using the MPEG-4 Codec to a file that is 5.7MB in size in the Windows Media format.

Benefits

With the AMD Athlon processor, Windows Media Technology users can create compressed files more quickly using the MPEG-4 codec. This format is used in Windows Media Technology applications, such as PowerPoint 2000 Web-based presentations and other applications using the ability to multicast from a Windows Media Server. The high-speed video compression enabled by the AMD Athlon gives end users new levels of productivity for many kinds of multimedia projects using video. Examples include sending video clips via e-mail over the Internet, creating high-impact online catalogs, remote training of personnel, and editing and storing video clips in both personal and professional video editing applications.

The Internet

Ligos LSX-MPEG Encoder



*See system configuration information on page 32.

Application Description

GoMotion from Ligos Technology is a video compression tool that enables high-quality video play at full resolution and full frame rate. This technology makes possible real-time digital video editing, DVD archiving, and video publishing on the Internet. GoMotion is available as a stand-alone utility and is embedded in most leading third-party hardware and software video applications including ATI's All-In-Wonder 128 products, 3Dfx's Voodoo3 3500 TV products, MGI's and Avid's video applications, and other OEM hardware systems.

Script Description

The AMD Performance Tester utility measures the time to compress a 30-second, 205MB AVI file into a 1.95MB file in the MPEG-2 format using the Ligos GoMotion LSX-Encoder.

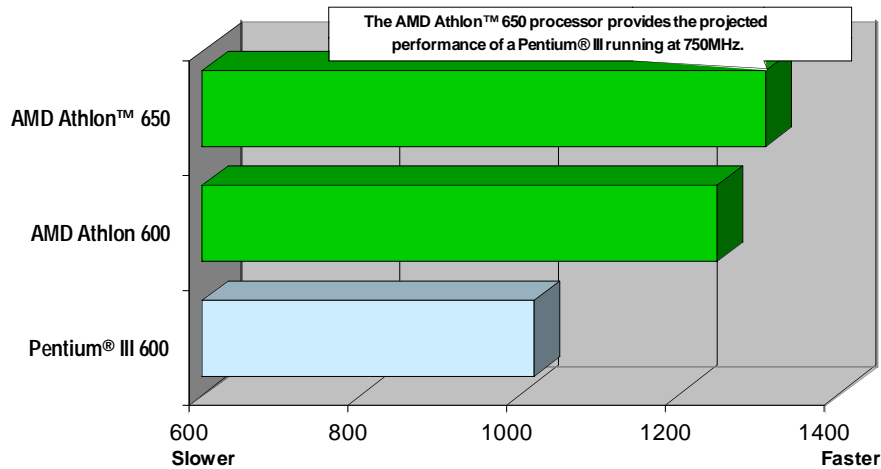
Benefits

Users can do near real-time MPEG-2 encoding of video clips at full D-1 resolution (720x480) at full frame rates, completely in software. With the AMD Athlon processor, end users can stream video content in near real time with higher resolution and larger window sizes, without special-purpose hardware. This enables more effective videoconferencing and real-time, online presentations with bigger, clearer video windows.

In addition, with the AMD Athlon processor, Ligos GoMotion users can create compressed files more quickly in the MPEG-2 format. Because the encoded file size is more than 100 times smaller than the original file size, transmission and download times are faster and more efficient, resulting in a richer Internet experience, as well as more compelling multimedia content over corporate and small business intranets. The high-speed video compression enhanced by the AMD Athlon processor brings new levels of productivity to end users for many kinds of multimedia projects involving video. Examples include sending video clips via email over the Internet, creating high-impact online catalogs, remote training of personnel, and editing and storing video clips in both personal and professional video editing applications.

The Internet

JMark 2.0 Advanced Processor Test



*See system configuration information on page 32.

Benchmark Description

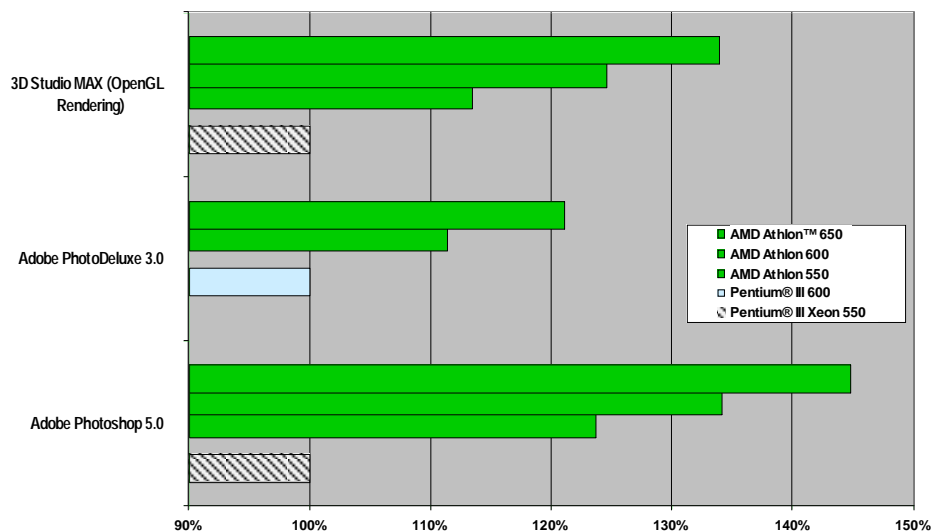
The Ziff-Davis (ZD) JMark 2.0 Advanced Processor Test evaluates the processor performance of the Java Virtual Machine. The Java Virtual Machine is a piece of software embedded in a Web browser, such as Microsoft Internet Explorer or Netscape Navigator, or on a Java network computer that is responsible for running Java software or applets.

Benefits

Much of the new content being delivered to end users over the Internet is through applications or “applets” that are based on the Java programming language. The AMD Athlon processor’s faster execution of Java applets, as demonstrated with the JMark benchmark, enables faster execution of this cutting-edge Java application. Java applets are used by leading-edge Web site developers to deliver many advanced features, such as streaming stock market information, real-time sports scores, and online financial calculators. Users of AMD Athlon processor-based platforms are able to run these critical Java applications on the Internet more rapidly, which provides a more user-friendly and productive Web experience.

Digital Content Creation

Digital Content Creation Performance (Normalized)



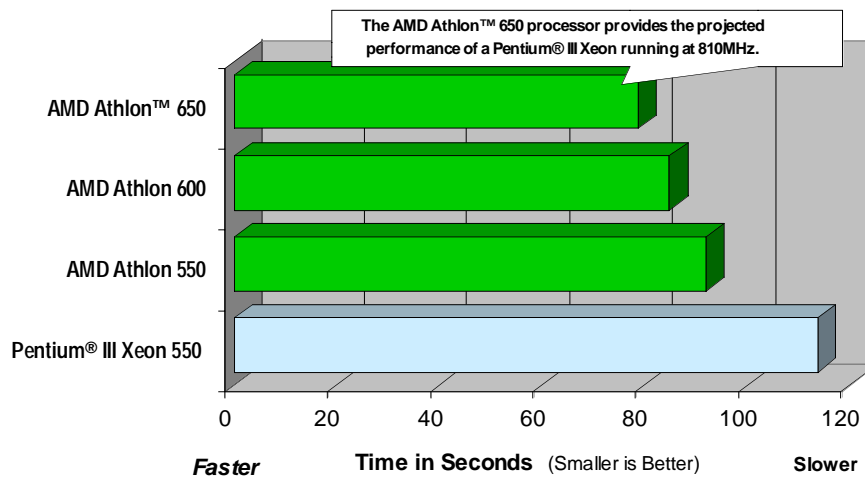
*See system configuration information on page 32.

Powerful, new software programs for digital content creation are being used in a wide range of computation-intensive applications, including desktop publishing, Web site development, and advertising.

The AMD Athlon processor sets a new performance standard for digital content creation professionals, as measured by leading application benchmarks in this category. The advanced, high-speed floating-point architecture of the AMD Athlon, combined with its enhanced 3DNow!™ technology, works to eliminate the bottlenecks normally associated with digital content creation and provides headroom for next-generation applications. The advanced performance and capabilities of the AMD Athlon processor deliver important improvements for key digital content creation activities, such as image rendering, 3D modeling, and applying filters and effects to images.

Digital Content Creation

Adobe Photoshop 5.0



*See system configuration information on page 32.

Application Description

Adobe Photoshop sets the standard for producing digital images in the widest variety of media and formats, including photo retouching and creating composite images. Photoshop creates high-quality images for the print and media market, including images used for distribution on the Internet. Photoshop enhances the image design and production process in a wide variety of applications and has an installed base of more than three million users.

Script description

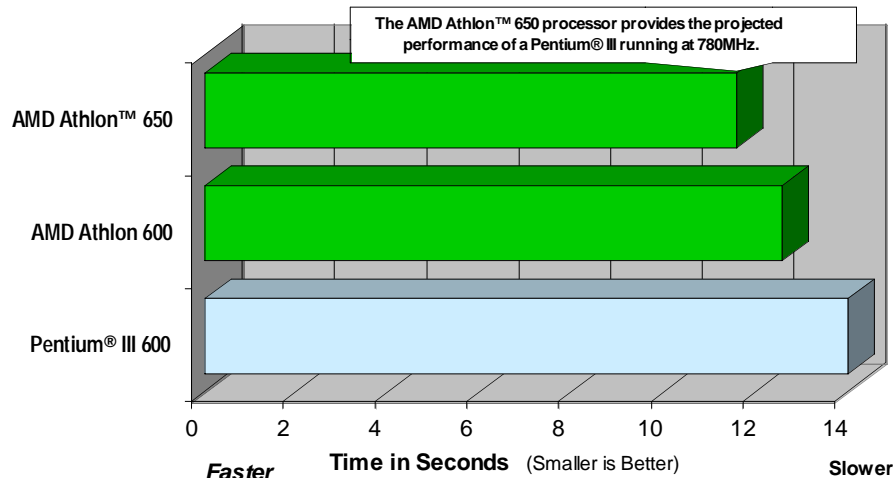
The AMD Performance Tester measures the time it takes to apply 42 Photoshop imaging functions and filters on five (four unique) Photoshop images. The tests include functions such as adjusting image size, making color changes, and performing special effects using high-end specialized filters and plug-ins from Adobe and several leading third-party developers.

Benefits

Graphic artists spend many hours a day manipulating Photoshop files. The added performance of the AMD Athlon processor allows artists to accomplish their desired results more quickly. Because many of the file sizes these artists work with can exceed tens or even hundreds of megabytes, performance improvements provided by the AMD Athlon platform can translate into significant productivity increases. In addition, the increased processing power provided by the AMD Athlon processor allows detailed, precision viewing and rendering of complex images, giving Photoshop professionals increased flexibility and power in the design process.

Digital Content Creation

Adobe PhotoDeluxe 3.0



*See system configuration information on page 32.

Application Description

Many of the complex filters and special effects previously reserved only for graphics professionals using expensive, high-end platforms are now available to home computing users in the PhotoDeluxe 3.0 software package. Adobe PhotoDeluxe is a widely distributed, inexpensive tool used to repair or enhance photographs. The software enables the end user to easily import photos from sources such as color scanners, digital cameras or Kodak Photo CDs. The step-by-step guided activities lead the user through the process of retrieving and enhancing photos and then dropping them into hundreds of high-quality templates for a wide range of applications, from holiday greeting cards to T-shirts—even multimedia presentations. Created photos can then be printed, posted to the Web, or sent by e-mail.

Script description

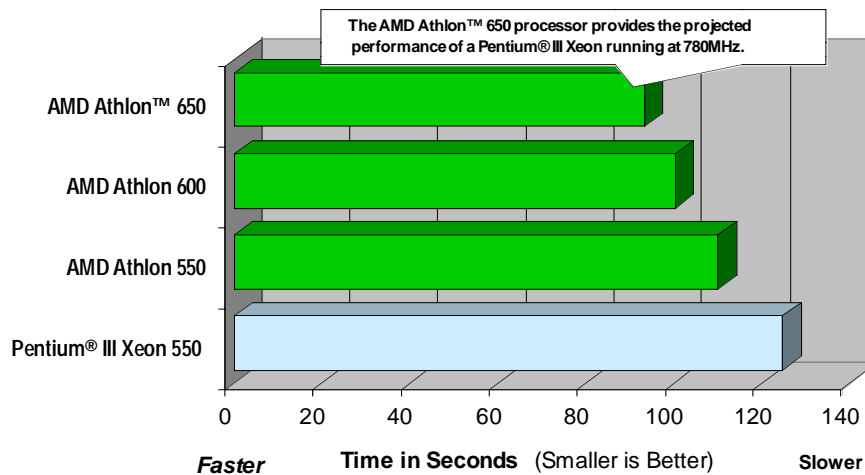
The AMD Performance Tester for Adobe PhotoDeluxe measures the total time the system takes to manipulate an image using sizing functions, image rotation commands, and a variety of filters.

Benefits

The speed with which the advanced filters and special effects available in PhotoDeluxe 3.0 can be applied to images is greatly improved when running on a platform powered by the new AMD Athlon processor. This faster image manipulation capability translates into ease of use for PhotoDeluxe users and an enhanced overall computing experience.

Digital Content Creation

3D Studio MAX (OpenGL Rendering)



*See system configuration information on page 32.

Application Description

3D Studio MAX 2.5 from Kinetix is an object-oriented animation system that is one of the most widely used creative tools for 3D animation, 3D modeling, and design. It revolutionizes the workflow and productivity of animators and studios who create animation and special effects for a wide variety of game development products, films, television series, and broadcast commercials. In addition, the Kinetix content creation tool is used by professionals such as web content developers, architects, engineers, and designers.

Script description

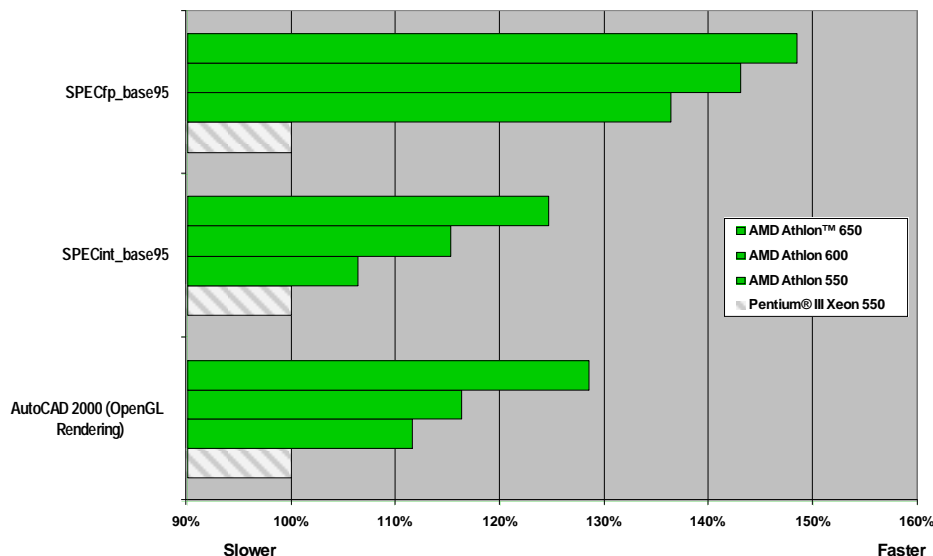
The AMD Performance Tester features a benchmark utility created by Kinetix to measure the application performance of 3D Studio MAX 2.5 running on the AMD Athlon processor and other platforms. The utility measures the time to load a 1MB 3D Studio MAX file with 2MB of texture files, as well as the time to perform various operations and render a picture.

Benefits

Many of the complex modeling and animation tasks undertaken by users of 3D Studio MAX are very complex and time intensive. The advanced architecture and features of the AMD Athlon processor enable users to perform these complex 3D design and rendering activities much faster than previously possible. The resulting time savings enable a more productive and creative work environment for the users of Kinetix 3D Studio MAX.

CAD/Workstation Applications

CAD/Workstation Application Performance (Normalized)



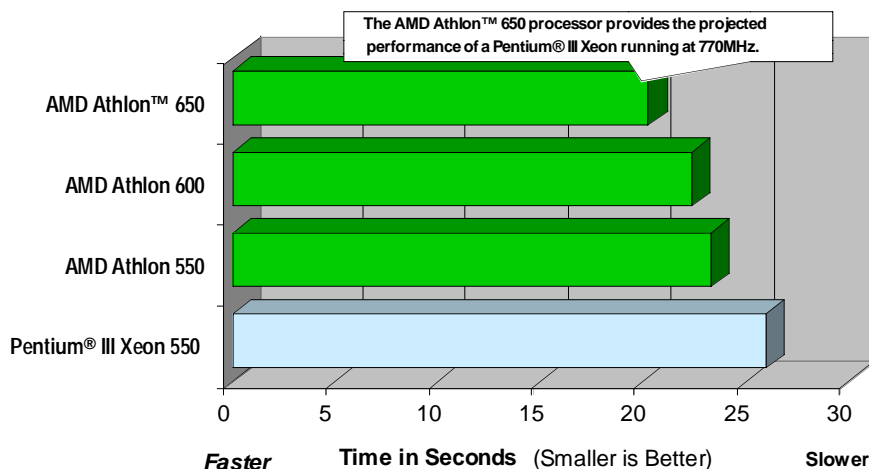
*See system configuration information on page 32.

The AMD Athlon processor delivers cutting-edge performance for a wide range of workstation applications. Robust floating-point performance has become essential for workstation users running the latest software applications in such areas as computer aided design (CAD), desktop publishing, digital content creation, and mathematical, scientific and statistical calculations. These workstation applications rely on the microprocessor's on-chip floating point engine to perform complex mathematical calculations.

The AMD Athlon processor provides the most powerful and architecturally advanced floating point execution engine ever delivered in an x86 microprocessor. This high-performance floating-point unit, combined with enhanced 3DNow! technology, easily meets the requirements of number-crunching-intensive workstation applications.

CAD/Workstation Applications

AutoCAD 2000 (OpenGL Rendering)



*See system configuration information on page 32.

Application Description

Autodesk's AutoCAD 2000, one of the world's leading workstation applications, is an adaptable, 2D/3D design and drafting environment and toolset used for creating, modifying, and sharing accurate, information-rich drawings. AutoCAD is used in many diverse fields including architecture, engineering, construction, facilities management, mechanical design, and geographic information systems. In addition to being a standalone product, AutoCAD 2000 is also a powerful platform for developing specialized vertical solutions, providing benefits to the mapping, mechanical, architectural, and civil/survey/land and entry-level design markets.

Script description

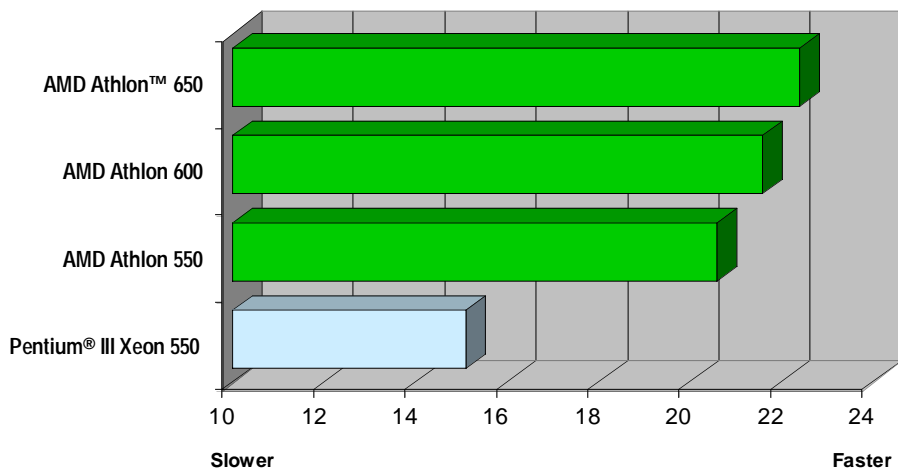
The AMD Performance Tester measures the time to load a 3D drawing and perform a series of rotations and renderings on the drawing. These functions are similar to the ones used in several CAD benchmarks and are very CPU and floating point-intensive.

Benefits

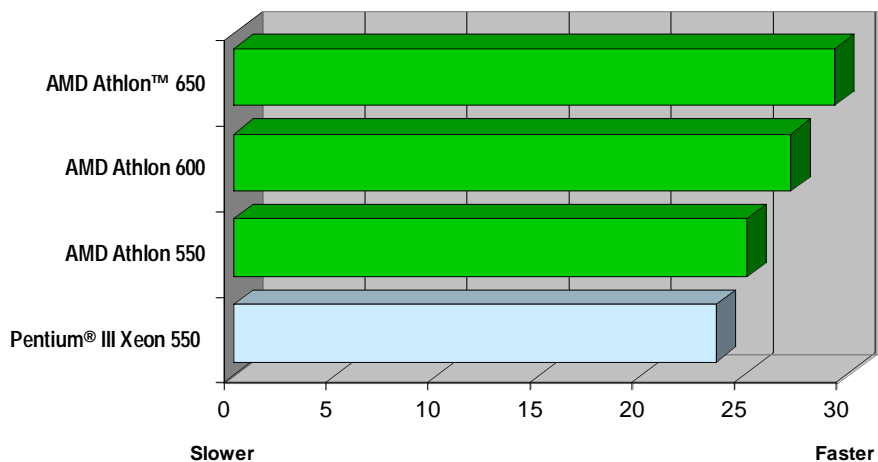
The AMD Athlon processor and the newly added, customer-driven feature sets of AutoCAD 2000 work together to enable end users to design at higher performance levels than ever before. The AMD Athlon speeds up the AutoCAD 2000 application's ability to multi-task several functions. In addition, the advanced floating point architecture and performance of the AMD Athlon processor enhances the performance of AutoCAD 2000's new 3D capabilities, such as the precision 3D viewing of complex drawings.

CAD/Workstation Applications

SPECfp_base95



SPECint_base95



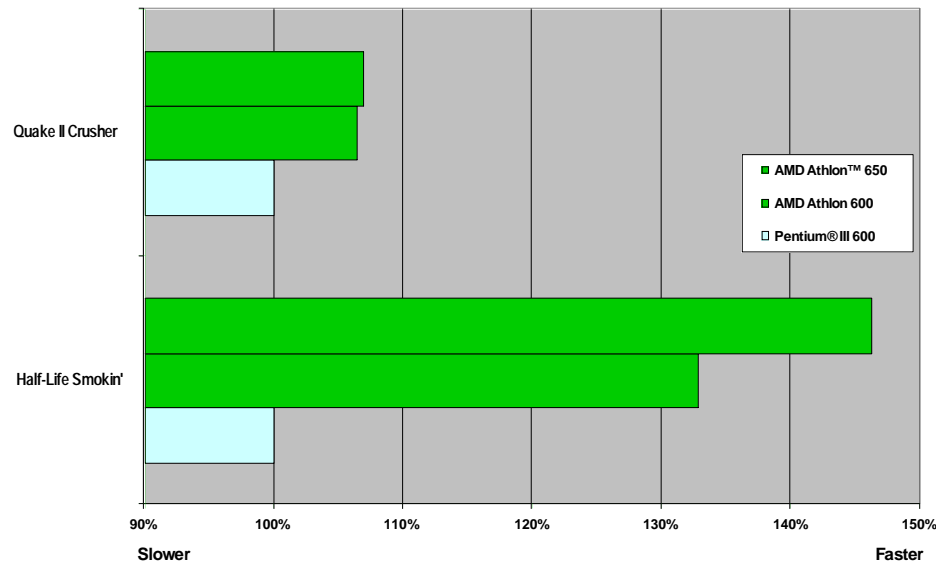
*See system configuration information on page 32.

Benchmark Description

Standard Performance Evaluation Corp. (SPEC) SPECfp_base95 and SPECint_base95 are components of the CPU95 suite, an industry standard for measuring and comparing a processor's floating point and integer performance. SPEC benchmarks are typically used by members of the scientific and technical communities to measure the performance of high-end computer systems and workstations and are widely recognized as some of the leading measures of processor performance.

Entertainment

Entertainment Application Performance (Normalized)

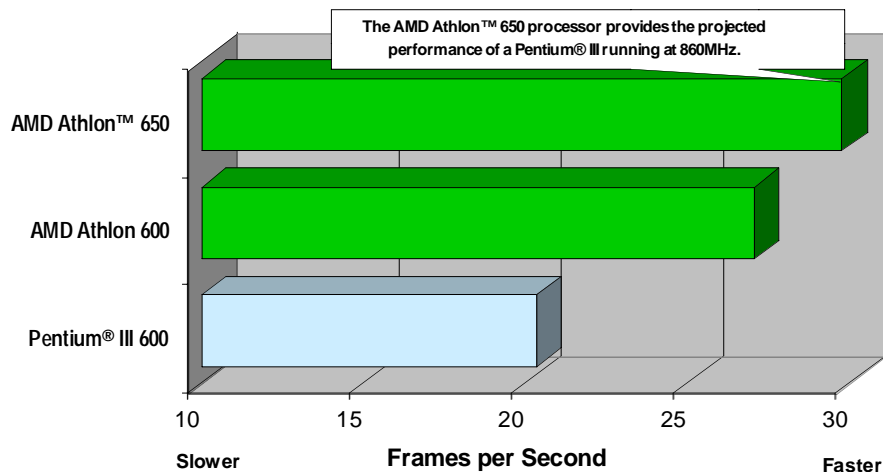


*See system configuration information on page 32.

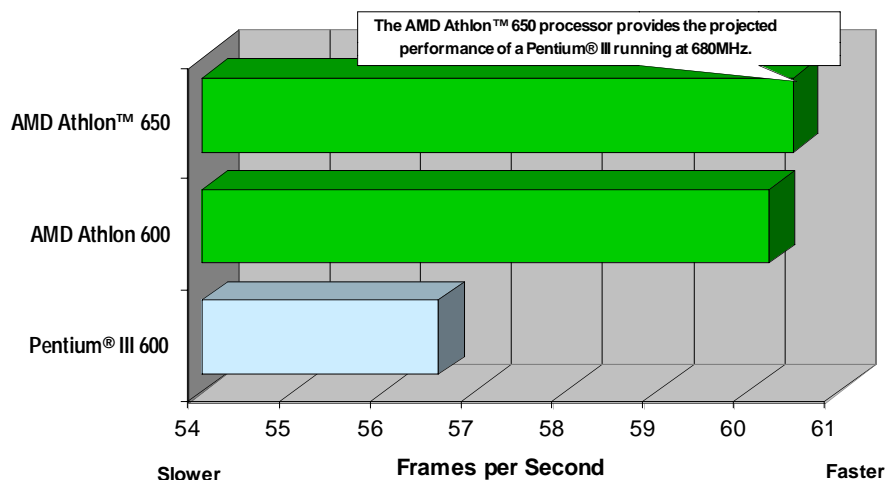
At home, the popularity of 3D entertainment and gaming titles has skyrocketed as software developers have tapped the power of on-chip floating point units and enhanced 3DNow! technology to deliver ever increasing levels of realism and detail in their latest titles. The AMD Athlon processor, with the x86 industry's most advanced and highest performance floating point unit, enables the ultimate delivery platform for these software developers and the ultimate digital entertainment experience for end users.

Entertainment

Half-Life Smokin'



Quake II Crusher



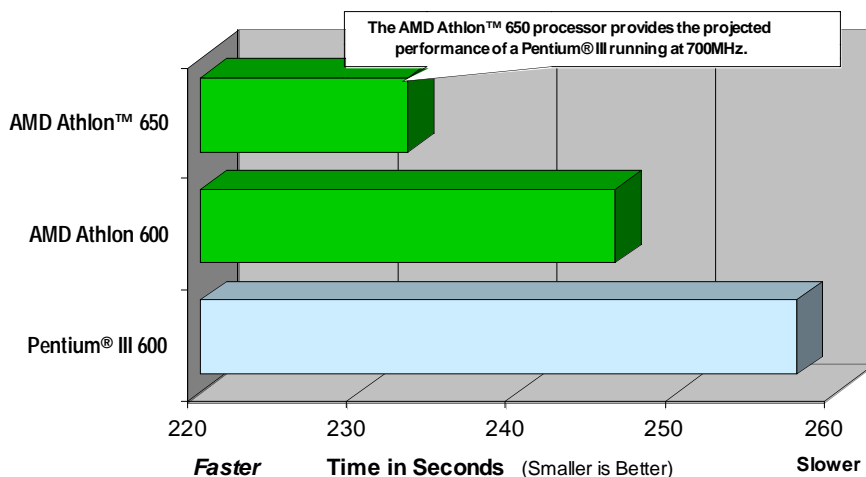
*See system configuration information on page 32.

Application Description

Half-Life is a top-selling 3D action/adventure game known for an unprecedented level of immersiveness created by a realistic world, intelligent inhabitants, and a compelling storyline. Quake II is a high-profile 3D-action game that showcases stunning 3D environments and models combined with robust multiplayer capabilities. Quake II and its technology have become a standard bearer for the 3D gaming industry. Quake II is commonly used as a performance benchmark for evaluating processor performance. The AMD Performance Tester measures the performance of these two leading entertainment applications using the well known “Smokin’ ” and “Crusher” demos for Half-Life and Quake II respectively.

Speech Recognition

Dragon NaturallySpeaking



* See system configuration information on page 32.

The AMD Athlon processor platform enables the fastest conversion of voice to text and provides the power to enable next-generation features in speech-recognition technology.

Application Description

NaturallySpeaking from Dragon Systems is a leading speech recognition tool that allows users to interact with computers using natural voice commands.

Script Description

The AMD Performance Tester runs Dragon's newest speech engine from the NaturallySpeaking product line. The benchmark uses this speech engine to measure the time it takes to convert a WAV file into text.¹

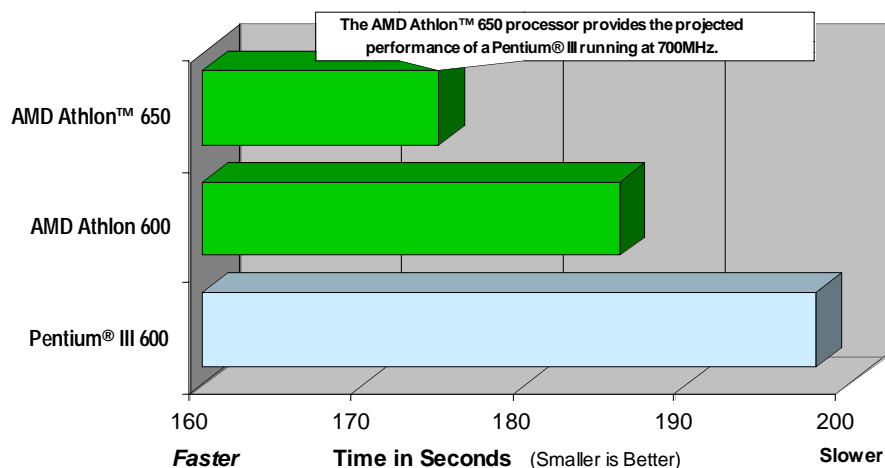
Benefits

The AMD Athlon processor and Dragon's NaturallySpeaking software enable computer users to be more productive producing documents in half the time it takes using traditional methods. Business professionals, doctors, lawyers, secretaries, writers, journalists, students, and educators all can use speech-recognition technology to create e-mail messages, documents, reports, letters, and notes with ease, speed, and accuracy.

¹ Note that the NaturallySpeaking final product software performs formatting and error correction that is not demonstrated in this preliminary version

Commercial 3D Modeling

Geometrix 3Scan



* See system configuration information on page 32.

The AMD Athlon processor enables high-performance numerical calculations required to create complex 3D models. Applications, such as Geometrix 3Scan, running on the AMD Athlon can take 3D modeling to new levels of affordability and ease-of-use.

Application Description

Using its Video Modeling process, Geometrix's 3Scan 3D scanner automatically converts video images into a polygonal, fully textured 3D model of an object. The first commercial product of its kind, 3Scan empowers 3D animators and modeling professionals by generating fully textured 3D models of objects in just minutes. This technology can also enable businesses to display their products in 3D on the Internet quickly and easily.

Script description

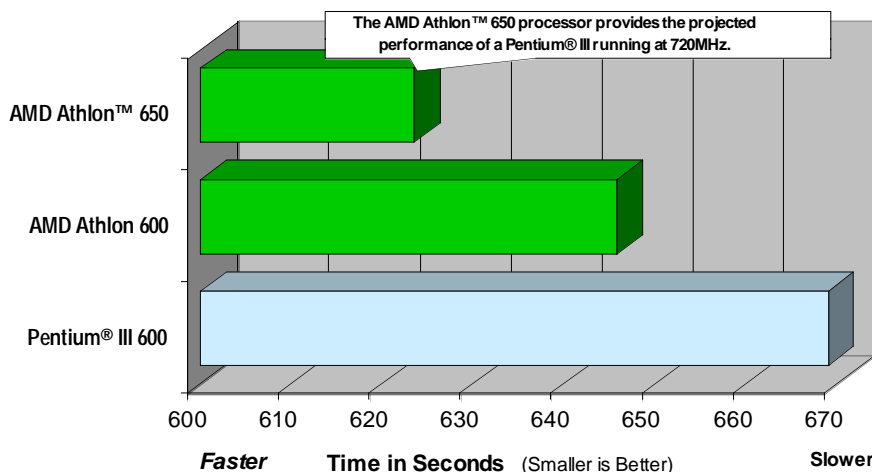
The AMD Performance Tester takes a series of images captured with a standard CCD video camera and proprietary Geometrix hardware and converts these images into a polygonal, textured model of the object.

Benefits

Geometrix 3Scan running on the AMD Athlon processor enables Web developers to easily incorporate 3D content on their Web sites without the need to incur the high learning curve of using 3D application software or the cost of employing 3D artists to create their content. Geometrix 3Scan and the AMD Athlon processor can enable animators to create high-quality 3D models at a fraction of the time and cost required using traditional modeling methods and digitizers that can cost \$25,000 and more. The benefits of 3D models can be leveraged by a whole new class of users, such as small business professional who want to market their merchandise on the Web for E-commerce.

Image Compression

LizardTech MrSID Publisher for GeoSpatial



* See system configuration information on page 32.

The AMD Athlon processor's high-performance, number crunching, and floating point capabilities enable faster image compression than previously possible with x86 systems.

Application Description

MrSID Publisher from LizardTech enables users to encode multiple images of virtually any size, even hundreds of gigabytes. It can also encode and seam together multiple images into a single image for applications such as high-resolution aerial photographs, topographic maps, satellite photography, and other digital imagery. This type of imagery is typically used in professional mapping and GIS applications for entire cities, countries, and other large geographic areas.

Script description

The AMD Performance Tester loads a 400MB TIF image file and measures the time it takes to compress the file to a format 20 times smaller than the original, or 20MB in size.

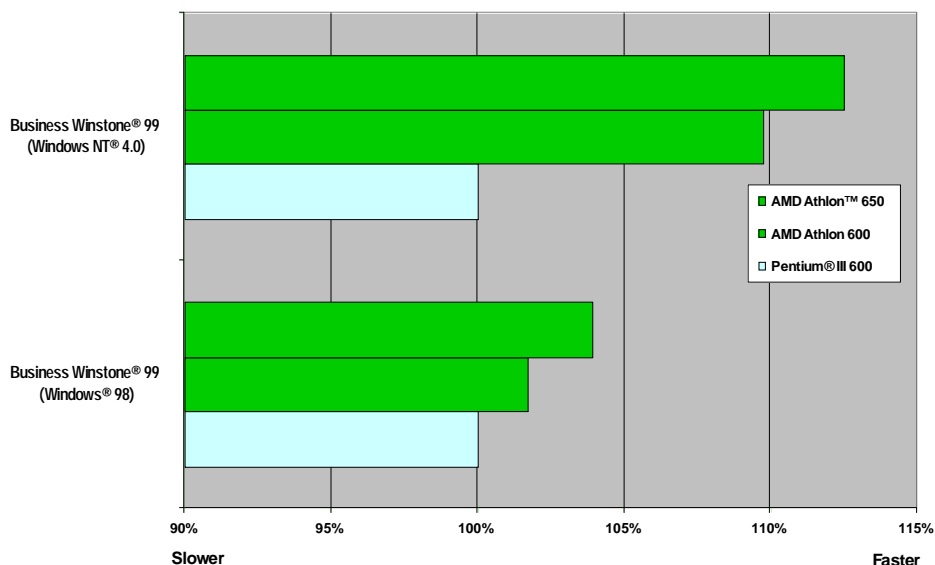
Benefits

As images became larger and very complex, the processing power of the AMD Athlon processor, coupled with the MrSID compression technology, can enable users to work in a highly productive environment without the wait times normally associated with image compression. Users are able to view, navigate, export, and print MrSID files noticeably faster. In addition, the compressed images are more easily and quickly transferred over the Internet, as well as corporate intranets.

Industry-Standard Benchmarks

Mainstream Applications

Mainstream Application Performance (Normalized)

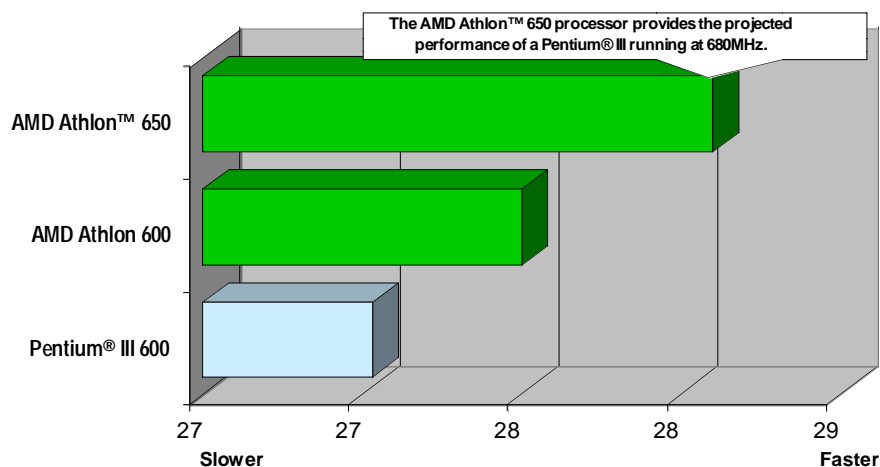


* See system configuration information on page 32.

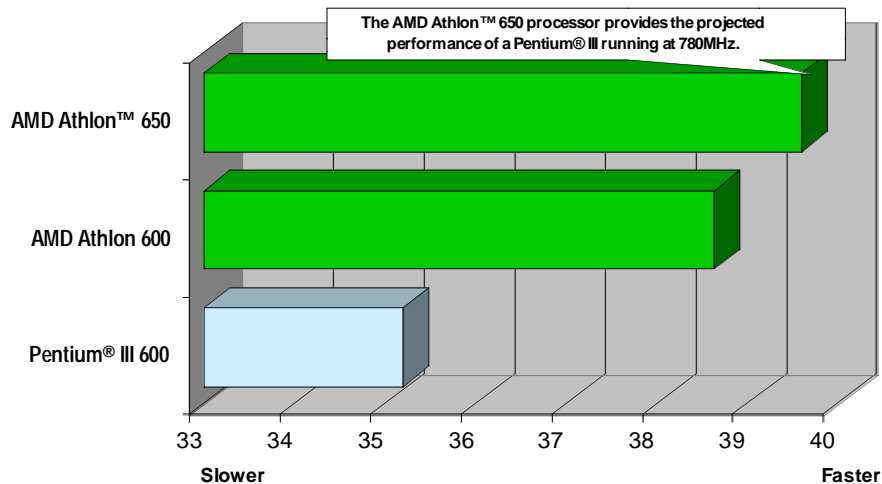
In addition to the dramatic performance advantages and new software capabilities that it enables in areas such as digital content creation, 3D imaging and digital entertainment, the AMD Athlon processor also provides significant performance advantages for the most commonly used productivity applications. These applications include word processors, spreadsheets, database and presentation software packages like those found in the Microsoft Office suite, as well as other commonly used productivity applications. The performance of these applications is most commonly measured using the industry-standard Winstone® benchmark developed by Ziff-Davis Inc.

Mainstream Applications

Business Winstone® 99 (Windows® 98)



Business Winstone® 99 (Windows NT® 4.0)



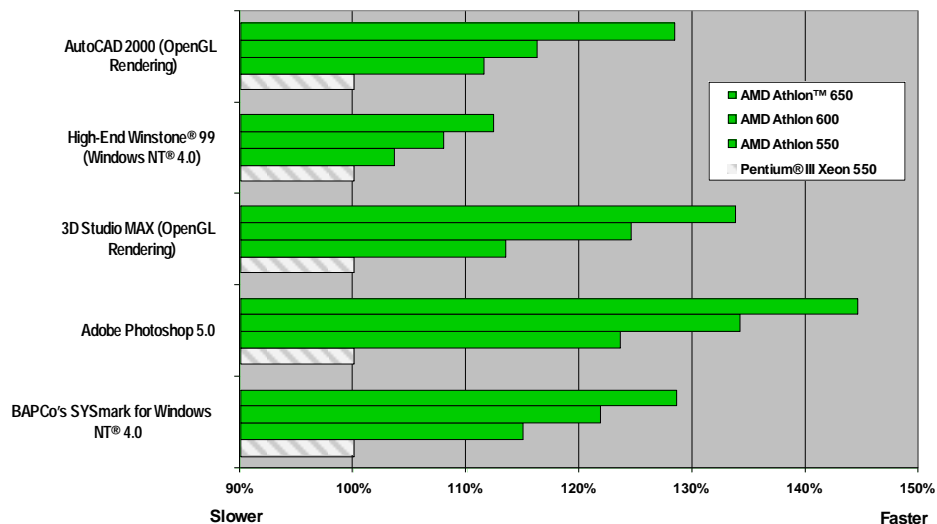
* See system configuration information on page 32.

Benchmark Description

Ziff-Davis (ZD) Business Winstone® 99 is an application-based benchmark that measures system performance when running popular Windows® based, 32-bit business applications. Winstone 99 uses real business-suite applications with scripts that mimic the usage patterns of typical computer users and allows end users and organizations to evaluate desktop systems for mainstream use.

Commercial High-End Applications

**Commercial High-End Application Performance
(Normalized)**

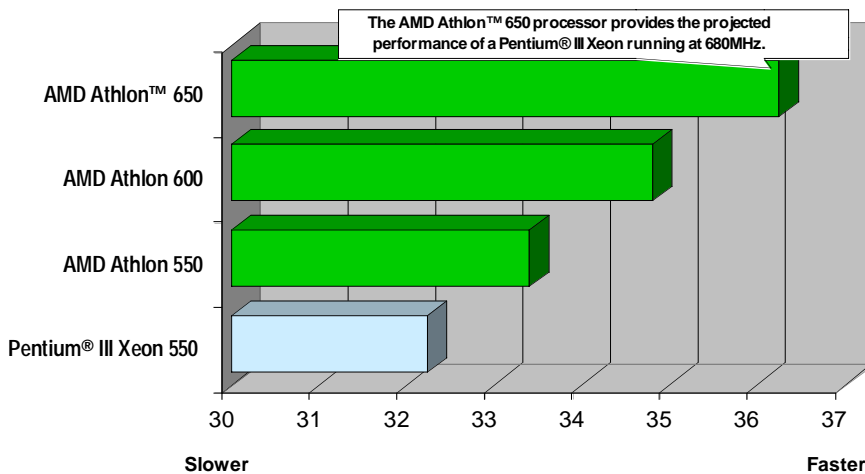


* See system configuration information on page 32.

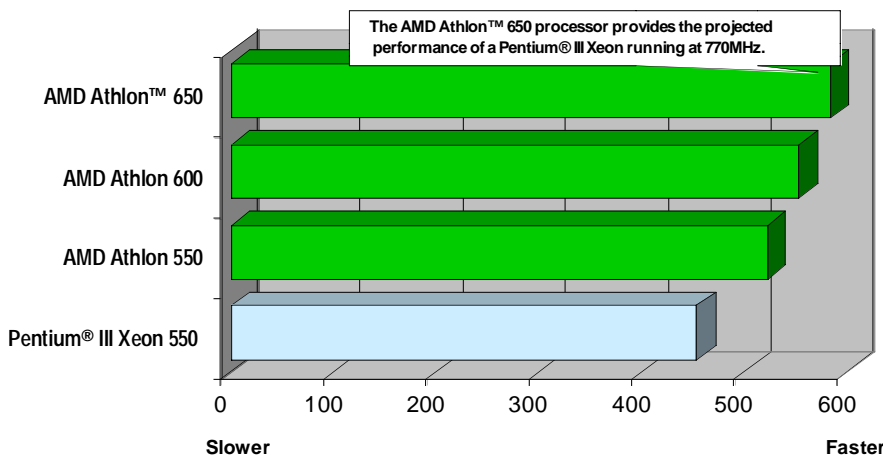
As discussed in the previous section, the AMD Athlon processor provides new levels of performance for the most demanding application categories, such as CAD, 3D image manipulation and digital content creation. In addition to the application performance measurements presented earlier (and summarized above), it is useful to measure platform performance using industry-standard benchmarks for high-performance computing, such as ZD's High End Winstone and BAPCo SYSmark.

Commercial High-End Applications

High-End Winstone® 99 (Windows NT® 4.0)



BAPCo's SYSmark for Windows NT® 4.0



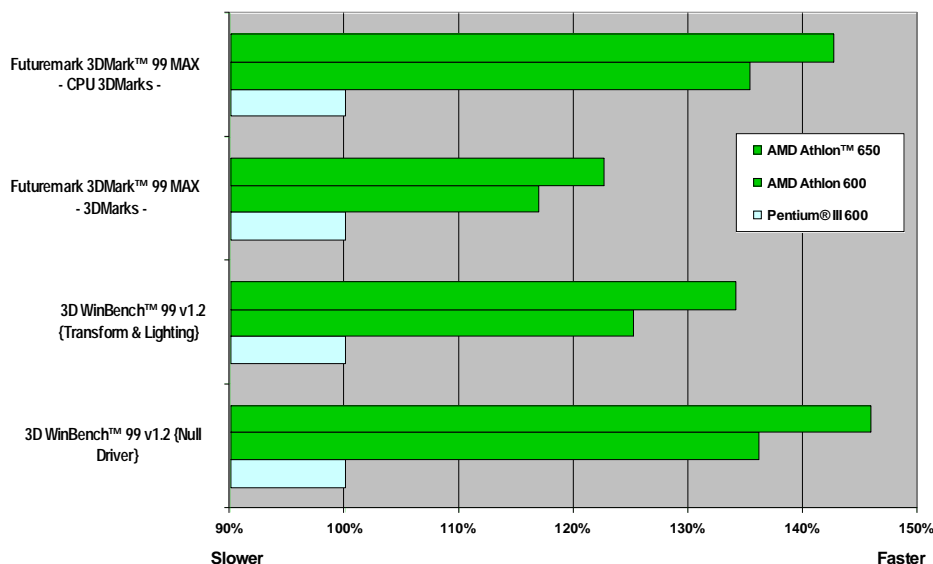
* See system configuration information on page 32.

Benchmark Descriptions

The Ziff-Davis (ZD) High-End Winstone® 99 benchmark is an application-based benchmark that measures a system's performance when running demanding applications such as image and video editing and CAD software. ZD High-End Winstone 99 allows computing enthusiasts and corporate power users to evaluate systems running high-end applications on Windows NT®. Business Applications Performance Corp. (BAPCo) SYSmark for Windows NT is an industry-standard benchmark for measuring system performance of computers running business applications under Windows NT. The SYSmark for Windows NT benchmark includes word processing, project management, CAD, and presentation graphics programs in a series of scripted activities.

3D Graphics

3D Graphics Performance (Normalized)

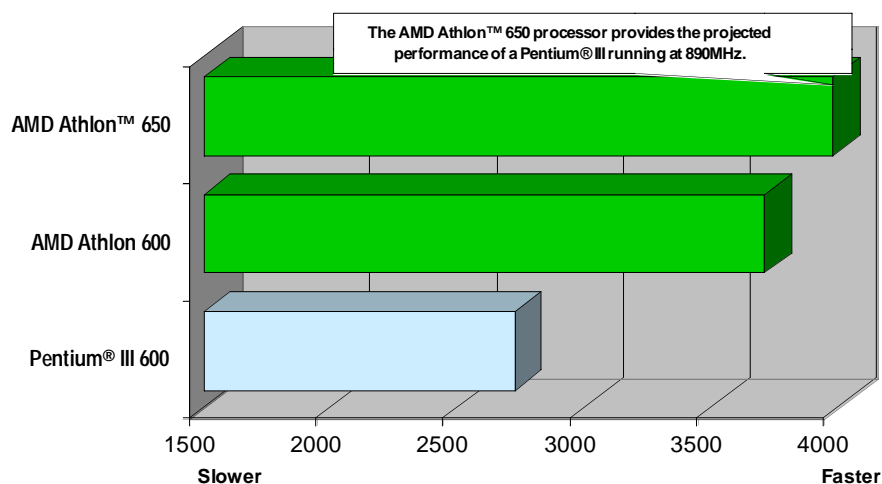


* See system configuration information on page 32.

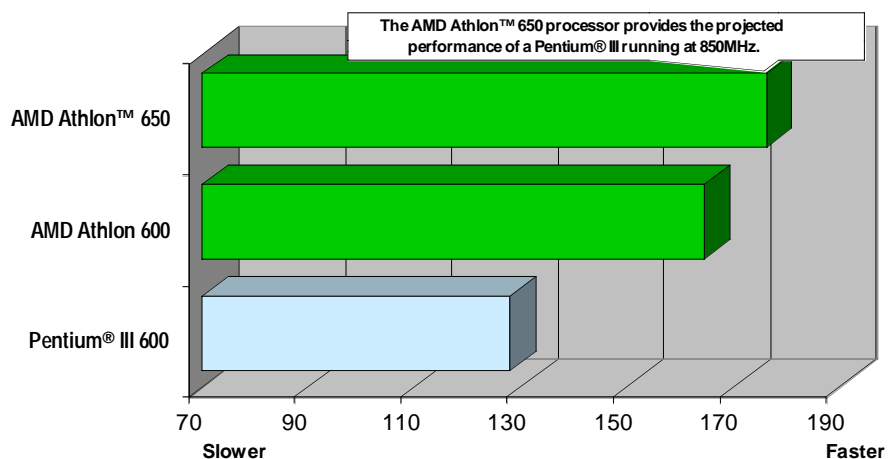
Many of the cutting-edge applications detailed in the previous section rely on the ability to deliver very complex and realistic 3D images to the user's screen to create a rich and realistic end user computing experience. The calculations required of the processor to deliver this realism are highly complex and very floating point-intensive. The AMD Athlon processor answers this challenge by providing the industry's most advanced floating point architecture combined with enhanced 3DNow! technology—AMD's leading-edge 3D instruction set extensions. This combination enables the AMD Athlon processor to deliver the highest 3D performance available, as measured by leading 3D performance benchmarks from Ziff-Davis, Inc. and Futuremark Corporation.

3D Graphics

3D WinBench™ 99 v1.2 {Null Driver}



3DWinBench99 (Transform) v1.2



* See system configuration information on page 32.

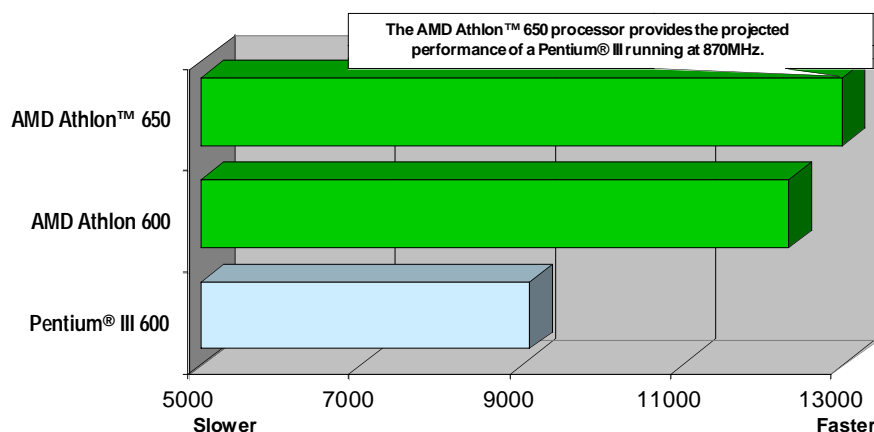
Benchmark Description

The Ziff-Davis (ZD) 3D WinBench 99 v1.2 benchmark, running with a Null Driver on Windows® 98, measures the performance of the processor's 3D capabilities using Microsoft DirectX 3D software. The Null Driver tests the CPU without the overhead that video cards and their complex drivers introduce.

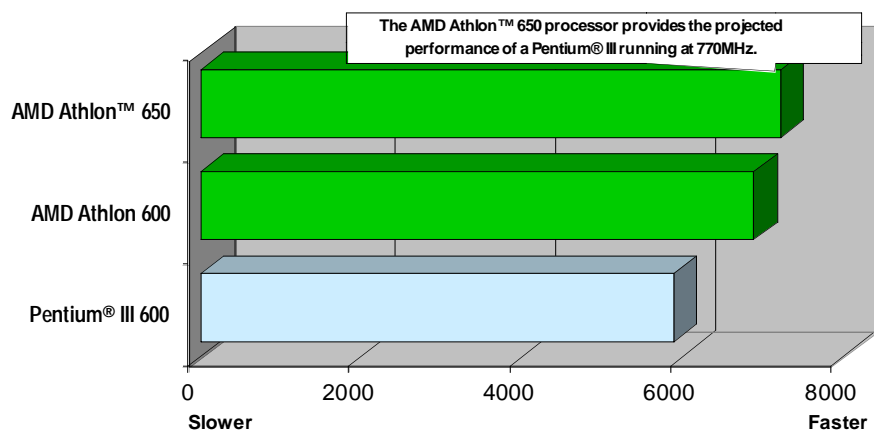
The Ziff-Davis (ZD) 3D WinBench 99 v1.2 benchmark, running with transform and lighting tests on Windows 98, measures the performance of the CPU's 3D capabilities using the Microsoft DirectX API. Use of both transform and lighting tests places maximum strain on CPU performance.

3D Graphics

Futuremark 3DMark™ 99 MAX - CPU 3DMarks -



Futuremark 3DMark™ 99 MAX - 3DMarks -



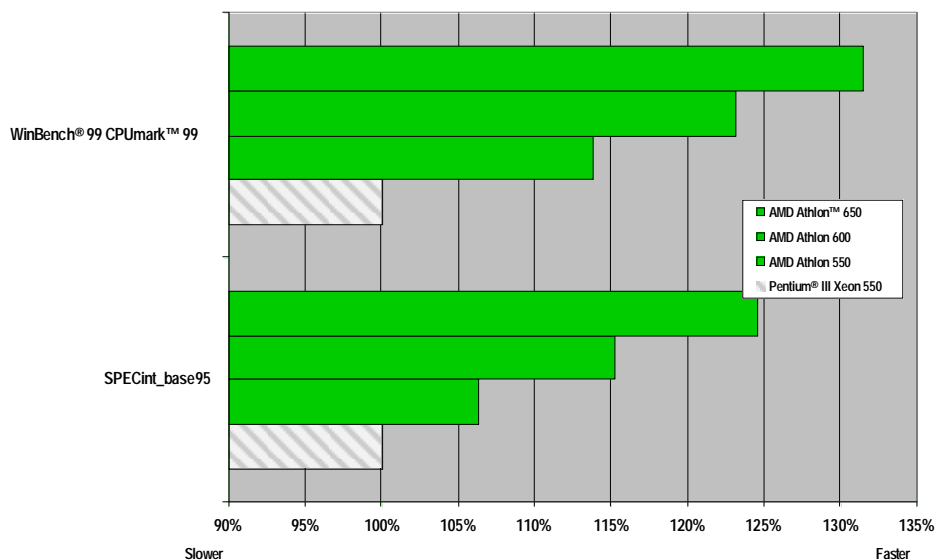
* See system configuration information on page 32.

Benchmark Description (3DMark)

3DMark™ 99 Max Professional Edition from Futuremark Corporation is a benchmark aimed at the 3D gaming community and focused on testing 3D performance of leading-edge systems. To test real gameplay situations, the benchmark uses Remedy Entertainment's proprietary 3D game technology, Max-FX, which has been optimized for both AMD's enhanced 3DNow! technology and Intel's SSE instructions. The benchmark reports two performance measurements, 3DMark and CPU 3DMark. The 3DMark score is an index indicating the total system performance in games. The CPU 3DMark score is an index indicating how fast the processor can handle large amounts of 3D geometry and lighting. More information can be found at www.3dmark.com.

CPU – Integer

CPU-Integer Performance (Normalized)

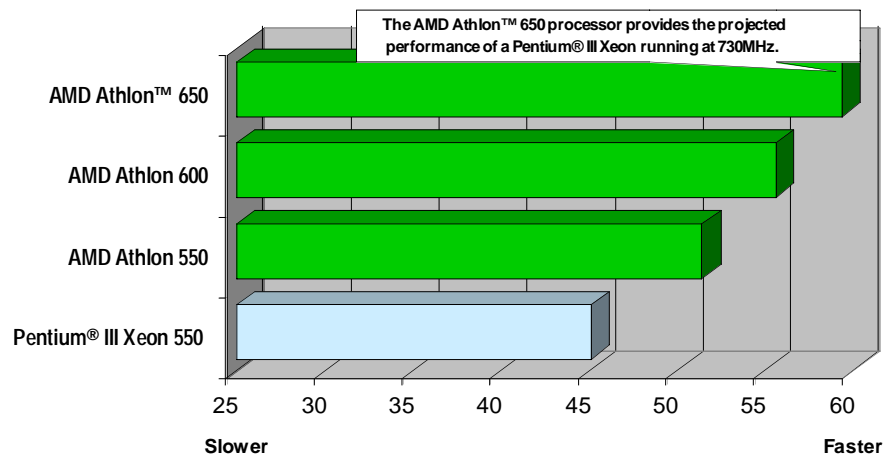


* See system configuration information on page 32.

The AMD Athlon processor provides top performance for integer code as measured by several industry-standard benchmarks.

CPU – Integer

WinBench® 99 CPUmark™ 99



* See system configuration information on page 32.

Benchmark Description

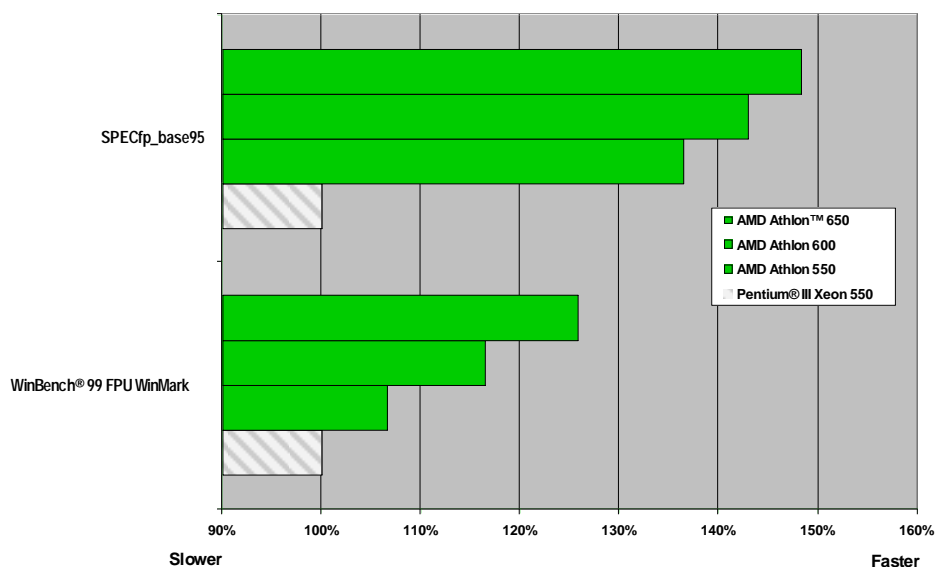
Ziff-Davis (ZD) CPUMark™ 99 is a component of the ZD WinBench® 99 benchmark that measures the performance of a system's processor and memory sub-systems. This benchmark measures the performance of a processor without the impact of other sub-systems, such as the graphics and disk sub-systems.

SPECint

Refer to the CAD/Workstation section above for a detailed description of the SPECint benchmark and results obtained with the AMD Athlon processor.

CPU – Floating Point

Floating Point Performance (Normalized)

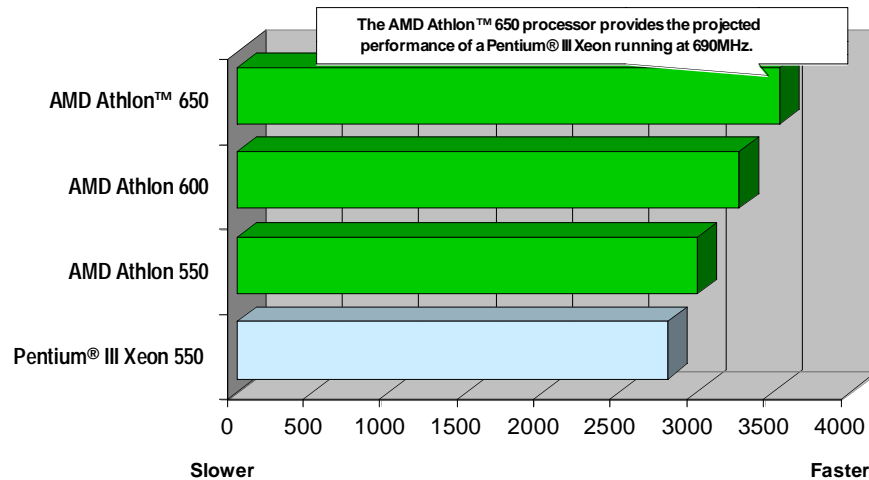


* See system configuration information on page 32.

The AMD Athlon processor provides top performance for floating point code, as measured by several industry-standard benchmarks.

CPU–Floating Point

WinBench® 99 FPU WinMark



* See system configuration information on page 32.

Benchmark Description

ZD's FPU WinMark™ 99 is a component of the ZD WinBench 99 benchmark that tests the floating point performance of a processor using applications running on Windows 98.

SPECfp

Refer to the CAD/Workstation section above for a detailed description of the SPECfp benchmark and results obtained on the AMD Athlon Processor.

Appendix

System Configuration

Application Versions

Overview of the AMD Performance Tester

Microsoft® Windows® 98 Applications

System Configuration

AMD Athlon™ Processor Hardware:

- ❑ 650 MHz, 600 MHz, and 550 MHz AMD Athlon processors
- ❑ 512KB L2 SRAM cache on processor module
- ❑ AMD production level reference motherboard Rev. B* with the AMD-750™ chipset
- ❑ System BIOS Rev. AFTB00-1
- ❑ AMD Bus Mastering EIDE driver v1.03
- ❑ AMD AGP miniport driver v4.41

* This motherboard is not commercially available.

Intel Pentium® III Hardware:

- ❑ Pentium III processor 600 MHz and Pentium III Xeon processor 550 MHz
- ❑ 512KB L2 SRAM cache on processor module
- ❑ Pentium III 600 MHz: ASUS P2B Rev. 1.02 motherboard
Xeon 550 MHz: Tyan Thunder X Motherboard
- ❑ Pentium III 600 MHz: System BIOS Rev. 1008 beta 4 (latest revision available from Asus)
Xeon 550 MHz: System BIOS 1.02
- ❑ Bus Mastering EIDE driver 5/11/98
- ❑ AGP miniport driver 5/11/98

Common (used on both Intel and AMD configuration):

- ❑ Diamond V770 based on the nVidia TNT2 Ultra with 150 MHz core, 183MHz memory clock, 32MB Video memory and nVidia TNT2 Ultra Driver rev 1.81 under Windows® 98 and Windows NT® 4.0.
- ❑ Windows 98 –1024 x 768 pixels with 16bpp color and a refresh rate of 100Hz.
- ❑ Windows NT –1024 x 768 pixels with 32bpp color and a refresh rate of 100Hz.
- ❑ Western Digital Expert WD41800, 18MB, EIDE hard drive
- ❑ Window 98 – using FAT32 and UDMA4/UDMA66² with an integrated HDC. No hardware cache.
- ❑ Window NT – using NTFS and UDMA4/UDMA66³ with an integrated HDC. No hardware cache.
- ❑ Single PC100 128MB (SDRAM)
- ❑ Creative Labs Soundblaster Live! (Value) Audio with Live!Wire 2.0 drivers and no speakers.
- ❑ Linksys HPN100 Home Ethernet card
- ❑ Toshiba SCM1212 6x DVD ROM drive
- ❑ Dual Boot Microsoft® Windows 98 and Windows NT Workstation 4.0 operating systems using Norton System Commander
 - Windows NT 4.0 with Service Pack 4
 - Windows 98 First Edition with DirectX 6.1A (Build 2150)

² The Intel Pentium III platform does not support the new UDMA4/UDMA66 EIDE standard in the chipset, so the drive operates in UDMA2/UDMA33 mode on the Intel platform

³ The Intel Pentium III platform does not support the new UDMA4/UDMA66 EIDE standard in the chipset, so the drive operates in UDMA2/UDMA33 mode on the Intel platform

Application Versions

Operating System:

- ❑ Microsoft Windows 98 1st Edition v4.10.1998; DirectX 6.1A (Build 2150)
- ❑ Windows NT v4.0 Build 1381 Service Pack 4

Windows NT[®] Applications/Benchmarks:

- ❑ Adobe PhotoShop v5.02 with the following plug-ins: Extensis Phototools v3.0 and Alien Skin Xenofex v1.0 and EyeCandy v3.0 (all are current production shipping versions)
- ❑ Autodesk AutoCAD 2000 R15.0.0 (current production shipping version)
- ❑ BAPCo SYSmark for Windows NT v4.0
- ❑ Dragon NaturallySpeaking engine update v1.0.0.1 (pre-release of production shipping version 7/99)
- ❑ Kinetix 3D Studio MAX v2.5.0.0 (current production shipping version)
- ❑ SPEC CPU95
- ❑ ZD's Winstone[®] 99 Version 1.0

Windows 98[®] Application/Benchmarks:

- ❑ 3DMark[™] 99 MAX Pro by Futuremark Corporation, Build 200 with AMD Athlon 3DNow! DLL
- ❑ Adobe PhotoDeluxe v3.0 (current production shipping version)
- ❑ Geometrix 3Scan v1.0 Beta (pre-release of production shipping version 7/99)
- ❑ id Quake II Crusher v.3.20 AMD build 990204 (current production shipping version)
- ❑ Ligos LSX-MPEG Encoder (GoMotion) v15 (pre-release of production shipping version 7/99)
- ❑ LizardTech MrSID Publisher v1.3 (current production shipping version)
- ❑ Valve Half-Life Smokin' v1.0.0.5 (patch version 1.0.0.9) Build 893 (current production shipping version)
- ❑ Windows Media Technology v4.0.0.3688, with CODEC 'dll' v3.02.0.3625 (pre-release of production shipping version 7/99)
- ❑ ZD's 3D WinBench[™] 99 Version 1.2
- ❑ ZD's JMark[™] 2.0
- ❑ ZD's WinBench[®] 99 Version 1.1
- ❑ ZD's Winstone[®] 99 Version 1.0

⁵ The Intel Pentium III platform does not support the new UDMA4/UDMA66 EIDE standard in the chipset, so the drive operates in UDMA2/UDMA33 mode on the Intel platform

⁶ The Intel Pentium III platform does not support the new UDMA4/UDMA66 EIDE standard in the chipset, so the drive operates in UDMA2/UDMA33 mode on the Intel platform

Overview of the AMD Performance Tester

The AMD performance tester was created by AMD to measure the application performance on the AMD Athlon and compare it to other platforms. The AMD Performance Tester (also referred to as the “AMD Athlon Performance Processor – Benchmark Suite” or “AMD Benchmark Suite”) consists of a user interface shell that contains test scripts for each application. Some test scripts were provided by the ISV; some were jointly developed by both AMD and the ISV; and others were completely developed by AMD. For each application, the test scripts execute specific functions that represent what a real user would experience when running the application it tests. The functions were specifically chosen to highlight the performance-demanding portions of the applications where users would benefit by having a faster CPU and platform. The performance of these functions may not be representative of other functions in the application, and may not be representative of every person’s use of the applications. In addition, we used the latest versions (as of May 15th) made available to AMD for each application for the benchmark results. In some cases, this latest version was a pre-released version.

Rational Visual Test version 6.0 (Rational Software Corporation) was used to control a majority of the application benchmarks. It enabled the benchmark suite to load files and select menu items that controlled the functions used in each application. It also enabled AMD to collect the necessary timing information required for presenting the results of each benchmark. The following applications were controlled by Visual Test: PhotoShop, AutoCAD, 3Scan, MrSID, Ligos, NetShow, and PhotoDeluxe.

3D StudioMAX was controlled by a MAXScript file created by Kinetix. It performs its own timing data, and that data is transferred to the AMD Performance Tester through the StudioMax.txt file.

The Dragon console application performs its own timing and is reported at the end of the "l.log" file. It includes the time it takes to read in the "l.nsw" file.

Quake II was launched from the command line with a custom configuration file that sets certain game parameters. The game automatically dumps the time required to run the Crusher demo into a text file called "qconsole.log". The total time and frames per second are obtained from this file.

Half-Life was launched from the command line and creates a file called "fps.txt" that includes the average frame rate to run the smoking demo. The total time is computed by dividing the number of frames (1396) by the average frame rate reported in this file.

A more detailed description of each test and the availability of the specific version tested are given below. After running all selected benchmarks, the AMD Performance Tester displays the results relative to equivalently configured AMD Athlon 650, AMD Athlon 600, AMD Athlon 550, and Pentium III 550 processors.

Windows NT® Applications/Benchmarks

Adobe Photoshop Script Description

The AMD Performance Tester measures the time to perform a number of filters using Adobe built-in filters and 3 different plug-ins from Extensis (PhotoTools plug-in) and Alien Skin Software (Xenofex and EyeCandy plug-ins) on 5 (4 different) files listed below.

The AMD Performance Tester executes the following script sequences. The times to apply the filters are measured and then added together to produce the final result.

1. Load file CMYK Balloons.tif (878 KB). Apply each of the Alien Skin Xenofex filters listed below to the entire image using default initial settings and perform an “undo” operation after each filter: Baked Earth, Constellation, Crumple, Flag, Little Fluffy Clouds, Rounded Rectangle, Shower Door, Stain and Television. Close the file.
2. Load file Rockies.tif (688 KB). Apply the following sequence of filters to the entire image: Antimatter, Glass, Jiggle, Water Drops, PhotoButton, PhotoGlow, Paint Daubs, Polar Coordinates and Despeckle. Perform an “undo” operation after each applied filter. Close the file.
3. Load file Thai boat.tif (589 KB). Apply the following built-in Adobe filters on the entire drawing, followed by an “undo” operation after each filter: Difference Clouds, Lighting Effects, Sharpen Edges, Find Edges, Stained Glass and Texturizer. Close the file.
4. Load file Wilderness 200.psd (8.02 MB – Wilderness.psd with increased resolution to 200 pixels per inch).
Select the layer “bird” and apply **Xenofex - Baked Earth** filter to the layer “bird” with the following settings: Crack Length set to 12 pixels, Crack Width set to 5 pixels, Variation set to 34, Random Seed set to 59, Highlight Brightness set to 19, Highlight Sharpness set to 100, Lighting Direction set to 122 degrees, and Inclination set to 38 degrees. Perform an undo.
Select the layer “fish” and apply built-in **Texture – Stained Glass** filter to the layer “fish” with the default settings. Select the layer “landscape” and apply the **PhotoTools – PhotoGlow** filter to the layer “landscape” with Radiance set to 8.3 and Opacity of 50% with all other settings left at their default. Perform an undo.
Select layer “fisherman” and apply built-in **Blur – Gaussian Blur** filter with a Radius of 10 pixels. Perform an undo.
Change the Lightness of the “fisherman” layer to –28 by using the **Image Adjust – Hue/Saturation** menu command. Perform an undo.
Select the layer “landscape” and convert the image from Rectangular to Polar coordinates with the built-in **Render – Polar Coordinates** filter. Perform an undo.

Select the layer “landscape” and apply the built-in **Render – Difference Clouds** filter to the “landscape” layer. Perform an undo. Close the file.

5. Load file CMYK Balloons 175.tif (3.81 MB – CMYK Balloons.tif with increased resolution to 175 pixels per inch).
 - ❑ Set the image resolution to 150 pixels per inch. Perform an undo.
 - ❑ Apply the built-in **Pixelate – Crystallize** filter on the entire image with the default settings. Perform an undo.
 - ❑ Perform the **Sharpen Edges** built-in filter. Perform an undo.
 - ❑ Apply the **EyeCandy – Glass** filter with default settings. Perform an undo.
 - ❑ Use the **Gaussian Blur** built-in filter with a radius of 10 pixels on the entire image. Perform an undo.
 - ❑ Flip the image canvas horizontally. Perform an undo.
 - ❑ Apply the **Xenofex – Flag** filter with default settings. Perform an undo.
 - ❑ Apply the **Xenofex – Television** filter with default settings. Perform an undo.
 - ❑ Perform the **Stylize – Find Edges** filter. Perform an undo.
 - ❑ Convert the image from Rectangular to Polar coordinates using the **Distort – Polar Coordinates** built-in filter. Perform an undo.
 - ❑ Apply the **Render – Difference Clouds** filter with default settings. Perform an undo.
 - ❑ Close the file.

File 1: CMYK Balloons.tif (878 KB)

Vendor	Plug-in Name	Filter Name
Alien Skin	Xenofex	Baked Earth
Alien Skin	Xenofex	Constellation
Alien Skin	Xenofex	Crumple
Alien Skin	Xenofex	Flag
Alien Skin	Xenofex	Little Fluffy Clouds
Alien Skin	Xenofex	Rounded Rectangle
Alien Skin	Xenofex	Shower Door
Alien Skin	Xenofex	Stain
Alien Skin	Xenofex	Television

File 2: Rockies.tif (688 KB)

Vendor	Plug-in Name	Filter Name
Alien Skin	Eye Candy	Antimatter
Alien Skin	Eye Candy	Glass
Alien Skin	Eye Candy	Jiggle
Alien Skin	Eye Candy	Water Drops
Extensis	PhotoTools	PhotoButton
Extensis	PhotoTools	PhotoGlow
Adobe	Artistic	Paint Daubs
Adobe	Distort	Polar Coordinates
Adobe	Noise	Despeckle

File 3: Thai boat.tif (589 KB)

Vendor	Plug-in Name	Filter Name
Adobe	Render	Difference Clouds
Adobe	Render	Lighting Effects
Adobe	Sharpen	Sharpen Edges
Adobe	Stylize	Find Edges
Adobe	Texture	Stained Glass
Adobe	Texture	Texturizer

File 4: Wilderness 200.psd (8.02 MB – Wilderness.psd at 200 pixels per inch)

Vendor	Plug-in Name	Filter Name
Alien Skin	Xenofex	Baked Earth
Adobe	Texture	Stained Glass
Extensis	PhotoTools	PhotoGlow
Adobe	Blur	Gaussian Blur
Adobe	Image Adjust	Hue/Saturation
Adobe	Distort	Polar Coordinates
Adobe	Render	Difference Clouds

File 5: CMYK Balloons 175.tif (3.81 MB – CMYK Balloons.tif at 175 pixels per inch)

Vendor	Plug-in Name	Filter Name
Adobe	Image Size	Resolution: 150 pixels per inch
Adobe	Pixelate	Crystallize
Adobe	Sharpen	Sharpen Edges
Alien Skin	Eye Candy	Glass
Adobe	Blur	Gaussian Blur
Adobe	Rotate Canvas	Flip Horizontal
Alien Skin	Xenofex	Flag
Alien Skin	Xenofex	Television
Adobe	Stylize	Find Edges
Adobe	Distort	Polar Coordinates
Adobe	Render	Difference Clouds

AutoCAD 2000 Script Description

The performance tester loads a 3D drawing (16KB) with the following image: a 3D wireframe showing 3 concentric rings with a cube in the middle. AutoCAD is then configured to run in hardware-accelerated OpenGL mode using a wopengl6.hdi driver. The script rotates each of these 4 objects at 5-degree increments in 3D space about 4 different axis. These objects are then Gouraud shaded and the script then performs the same rotations in 3D space about 4 different axes on these rendered images. These functions are similar to the ones used in several CAD benchmarks and are very CPU and floating point

intensive. The script measures the time to perform the rotations in wireframe and then in Gouraud shaded mode.

Dragon NaturallySpeaking Script Description

The application benchmark for speech recognition features a performance test using Dragon's speech engine from the new version of NaturallySpeaking planned to be released in July 99. This script was developed by Dragon to represent the performance offered by the shipping application. The benchmark uses this speech engine (which has been optimized for both Pentium III, as well as the AMD Athlon processor) to measure the time it takes to convert a .NWV file into text. Note that the speech engine actually runs as a console application (that looks as a DOS window), and converts text using a windows utility, which displays the raw engine output without applying spell checking or formatting provided by the actual Dragon product.

Kinetix 3D Studio MAX Script Description

The performance measurement MAXScript created by Kinetix is intended to measure the application performance of 3D Studio MAX running on AMD Athlon and other platforms. The MAXScript measures the time to load a 1MB 3D Studio MAX file with 2MB of texture files and render a 640×360 (HDTV aspect ratio) picture. A 3dsmax.ini file is copied over to the 3D Studio MAX directory and is used to initialize the rendering settings for 3D Studio MAX. The viewport display driver is set to OpenGL hardware-accelerated mode.

In the modified scene supplied with this utility, three different types of materials are used: a raytraced material, a procedural material and bitmapped materials. There are 4 lights in the scene. (Note that rendering lights are an important metric of CPU horsepower). These operations were specifically chosen to tax the system in most ways: loading an application, loading a file, manipulating the file, and rendering the file. (Note also that the rendering operation is processor and RAM intensive, thus is a good benchmark for any system.)

RayTracing, one of the most CPU intensive tasks, calculates reflective and refractive properties of a 3D model. The complexity of the scene is further enhanced by calculating and rendering various shadows, created by the lights in the scene. These operations are CPU intensive tasks and contribute to increased rendering times.

Windows® 98 Application/Benchmarks:

3Dmark™ 99 MAX Pro by Futuremark Corporation, Build 200 with 3DNow! DLL for the AMD Athlon processor

The settings in the 3Dmark that have been used for the test are 1024 x 768 pixels, 16bit color, 16 bit Z-buffering, frame buffer: triple buffering, refresh rate: 100Hz and CPU optimization: 3DNow! Mode.

The AMD Athlon processor's enhanced 3DNow! DLL supplied on the NPRP system was created by AMD editing the binary image of the 3DNow! DLL for AMD-K6® family processors in the AMD labs. The changes include:

- Added data prefetching into two critical areas of the graphics pipeline.
- Fixing a bug in the original 3DNow! DLL which, although effects the benchmark score very little, causes the visuals of the two game scenes to appear much smoother.
- This new version will not run on AMD-K6 family processor-based systems.

This new DLL will not be distributed by either AMD or Futuremark, other than on the AMD Athlon NPRP systems. Although Futuremark does not intend to redistribute this DLL, they have reviewed and tested the changes. A fully optimized AMD Athlon version will be available in 3DMark 2000 later this year.

PhotoDeluxe Script Description

The AMD Performance Tester measures the time to perform a number of filters shown below on the image files Beach.pdd and Rockies.tif. The time taken to process all of the filters are added together to produce the final result.

The procedure is:

1. Load file Beach.pdd (1.36 MB).
2. Rotate the image to the left 90 degrees. Perform an undo.
3. Apply the following filters to the entire image using default settings and perform an "undo" operation after each filter: Colored Pencil, Blur More, Accented Edges, Funnel, Ripple, Despeckle, Dust & Scratches, Noise, and Page Curl. The file is left open.
4. Load file Rockies.tif (688 KB).
5. Apply the following filters to the entire image using default settings and perform an "undo" operation after each filter: Crystallize, Facet, Mosaic, Pointillize, Cloud Texture, Clouds, Sharpen, Sharpen Edges, Unsharp Mask, Bas Relief, Find Edges, Glowing Edges, Wind, and Patchwork.

File 1: Beach.pdd (1.36 MB)

Menu Category	Filter
Orientation	Rotate Left

Artistic	Colored Pencil
Blur	Blur More
Brush Strokes	Accented Edges
Distort	Funnel
Distort	Ripple
Noise	Despeckle
Noise	Dust & Scratches
Noise	Noise
Page Curl	

File 2: Rockies.tif (688 KB)

Menu Category	Filter
Pixelate	Crystallize
Pixelate	Facet
Pixelate	Mosaic
Pixelate	Pointillize
Render	Cloud Texture
Render	Clouds
Sharpen	Sharpen
Sharpen	Sharpen Edges
Sharpen	Unsharp Mask
Sketch	Bas Relief
Stylize	Find Edges
Stylize	Glowing Edges
Stylize	Wind
Texture	Patchwork

Geometrix 3Scan Script Description

The application benchmark for Geometrix takes a series of 40 images (900 KB each) captured with a standard CCD video camera and proprietary Geometrix hardware and converts these images into a polygonal, textured model of the object. The time measured in the benchmark is the time taken to process all 40 images and convert them into a 3D model. The conversion is performed with the following Modeling Option settings:

- ☐ Mesh Density is set to 2.
- ☐ Size of Cavity is set to 10.
- ☐ Number of Texture Views is set to 40.
- ☐ Compute Texture is checked.

id Quake II – Crusher Demo Description

The application benchmark launches Quake and executes the “demomap crusher” console command, with “timedemo” variable set to 1. Quake II has been setup to use enhanced 3DNow! technology OpenGL drivers instead of default OpenGL. The nVidia

graphics display card has also been tweaked to turn off the monitor vsync so the frame rate is not limited by the monitor refresh rate. The demo runs in 1024×768 full-screen 16 bit color mode. The sound has been disabled for this benchmark. The game is set up to brighten the surroundings with the following settings:

- ❑ set sid_gamma “0.5”
- ❑ set gl_modulate “2.2”
- ❑ set sw_stipplealpha “1”
- ❑ set intensity “3.0”

Ligos LSX-MPEG (GoMotion) Encoder Script Description

The AMD Performance Tester measures the time to convert a 30 second, 205MB 320x240 AVI file, at 30 frames per second, with 928 frames called “Flatzone.avi” (film clip with stereo) to the MPEG-2 format. The Ligos LSX-MPEG Encoder creates a 1.95MB file called “Flatzone.asf.”

LizardTech MrSID Publisher Script Description

The AMD Performance Tester loads the “Washdc.tif” file which is one of the samples included in the application and measures the time to compress the file. This file is basically a panoramic view of Washington DC taken from an aerial perspective and is 393MB in size.

Valve Half Life – Smokin’ Demo Description

The game is launched with the “-gamegauge smoking” command-line argument. The demo is also executed with other command-line arguments which set the video mode to hardware-accelerated OpenGL, 1024×768 full-screen mode.

Windows Media Encoder Script Description

The AMD Performance Tester measures the time to convert a 106 second, 11.6MB 320X240 AVI file, at 30 frames per second called “Barneysw.avi” to the MPEG-4 V3 format and create the output file “Barneysw.asf” (5.70MB).

ZD's 3D WinBench™ 99 Version 1.2

In the Test Settings dialog box used for the test, enable buffer flipping for full screen applications. This disables v sync.

ZD's Jmark 2.0

The system featured Microsoft® Internet Explorer 4.0 with Microsoft’s JDK API 45.3 patch.

AMD Overview

AMD (NYSE: AMD) is a global supplier of integrated circuits for the personal and networked computer and communications markets. AMD produces processors, flash memories, and products for communications and networking applications. The world's second-leading supplier of Windows compatible processors, AMD has shipped more than 120 million x86 microprocessors, including more than 60 million Windows compatible CPUs. Founded in 1969 and based in Sunnyvale, California, AMD has sales and marketing offices worldwide and manufacturing facilities in Sunnyvale; Austin, Texas; Bangkok, Thailand; Penang, Malaysia; Singapore; and Aizu-Wakamatsu, Japan. AMD had revenues of \$2.5 billion in 1998.

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